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# ***JPRS Report***

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# **Science & Technology**

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***USSR: Life Sciences***

# Science & Technology

## USSR: Life Sciences

JPRS-ULS-91-015

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28 June 1991

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**Plasticity and Resistance of Barley to Root Rot**

917C0324A Moscow SELEKTSIYA I  
SEMENOVODSTVO in Russian No 6, Nov-Dec 90  
pp 13-15

[Article by A. A. Sidorov, cand. biol. sci., Moscow Branch, All-Union Scientific Research Institute of Plant Sciences]

UDC 633.16:631.526.32.632.25

[Abstract] Between 1983 and 1985 an analysis was conducted on plasticity and resistance of 133 barley varieties vis-a-vis root rot agents *Fusarium culmorum* and *Helminthosporium sativum*. Infection with these agents has been shown to reduce germination by 28 percent and harvests by 33 percent, figures underscoring the importance of breeding strains able to withstand such agents. Regression analyses led to identification of Primevara (VIR catalog No. k-25938), Belogorskiy (k-22989), Kharkovskiy 70 (k-23683), Vypel (23647) and Triumph (k-21903) as high-plasticity varieties, and Odesskiy 70 (k-22024), Belogorskiy, Liman (k-26968), Roland (k-26897) and Krasnoufimskiy 95 (k-20920) as highly resistant varieties. The combination of both traits in the Belogorskiy variety renders it valuable for genetic research and breeding studies. Tables 1.

**Grain Quality of Regionally Grown Winter Wheat**

917C0324B Moscow SELEKTSIYA I  
SEMENOVODSTVO in Russian No 6, Nov-Dec 90  
pp 23-24

[Article by L. A. Zhivotkov and N. I. Blokhin, cand. agricult. sci., Mironovka Scientific Research Institute of Wheat Selection and Breeding]

UDC 633.111.1"324"631.526.32

[Abstract] A brief summary is presented of four winter wheat varieties recently tested in various areas of the USSR. Mironovskaya 40 is cultivated in the Transcarpathian Ukraine, yielding grain weighing 34.4 - 41.1 g/1000 seeds, and a gluten content of 29.8 - 38.5 percent. Mironovskaya 61 has yielded harvests as high as 9.80 tons/ha in the Zolochiv Rayon, Lvov Oblast, Ukraine, and is characterized by grain weight of 39.5 - 45.5 g/1000 seeds and a gluten content of 27.4 - 34.0 percent. In 1990 Mironovskaya 61 was cultivated in 11 Ukrainian oblasts, on a total area 350,000 ha. Cultivation of Volgogradskaya 84 in the Volgograd Oblast has yielded grain weighing 39.5 - 44.7 g/1000 seeds with a gluten content of 29.0 - 40.2 percent. Finally, Komsomolskaya 56 variety has been cultivated in Eastern Kazakhstan, Tyumen Oblast and Altay Kray. The weight of 1000 seeds has averaged 42.5 g and the gluten content has been found to range from 31.0 - 35.8 percent.

**High Quality Rape and Wintercress Hay and Aftercrop**

917C0324C Moscow SELEKTSIYA I  
SEMENOVODSTVO in Russian No 6, Nov-Dec 90  
pp 27-28

[Article by A. V. Anashchenko, doct. biol. sci., and D. R. Maysyamova]

UDC 633.853.492/.494:631.527

[Abstract] Beginning with 1986 extensive studies have been conducted in Tyumen Oblast on quality of hay and aftercrop obtained from 27 varieties of rape and 16 varieties of wintercress. Evaluation of the Soviet and foreign varieties maintained at the All-Union Institute of Plant Science revealed considerable variations in terms of harvests and quality. The data showed that the highest levels of carotin, approaching 81.1 mg/kg, are obtained when the crops are mowed during flowering. In general, in terms of nutrient levels and yield highest quality hay and aftercrop was obtained when harvesting was conducted during budding.

**Race-Specific Resistance of Soviet and Foreign Wheats to Brown Rust**

917C0324D Moscow SELEKTSIYA I  
SEMENOVODSTVO in Russian No 6, Nov-Dec 90  
pp 30-34

[Article by M. Ye. Sinigovets, All-Union Scientific Research Institute of Phytopathology]

UDC 633.11:631.524.85

[Abstract] A detailed analysis was conducted on the susceptibility of 700 Soviet and foreign varieties of winter and spring wheat to eight races of brown rust pathogen isolated from different regions of the USSR. Determinations of inheritance patterns for resistance led to identification of promising varieties that may be used for breeding purposes with expected production of highly and moderately resistant F<sub>2</sub> hybrids. Varieties with susceptibility levels of 5S-MS to 20S-MS have been classified into broad groups convenient for hybridization experiments. Tables 1.

**Winter Triticale: Dar Belorussii Variety**

917C0324E Moscow SELEKTSIYA I  
SEMENOVODSTVO in Russian No 6, Nov-Dec 90  
pp 34-35

[Article by V. Ye. Rosenkova, M. V. Mastepanova, S. I. Grib, L. V. Kuchinskaya and Ye. L. Polyakova, Belorussian Scientific Research Institute of Agriculture and Feed]

UDC (633.11+633.14)''324'':631.526.32

[Abstract] Dar Belorussii in a new hexaploid variety of winter triticale representing an  $F_3$  hybrid obtained by crossing Mexican Armadillo i-346939 variety with AD 206. Cultivation in Smolensk, Bryansk, Kaluga and Tula oblasts commenced in 1990, yielding average harvests of 6.01 tons/ha. The protein content of the grain ranges from 13.0 - 15.0 percent and, within the conditions of Belorussia, this variety has been found resistance to a wide variety of plant pathogens, including brown and stem rusts, powdery mildew, smut, etc.

#### VNIIR 8847: Novel Rice Variety

917C0324F Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 6, Nov-Dec 90 pp 36

[Article by V. S. Kovalev, G. D. Los, cand. agricult. sci., and A. S. Dmitriyeva, All-Union Scientific Research Institute of Rice (VNIIR)]

UDC 633.18:631.526.32

[Abstract] A novel rice variety, named VNIIR 8847, has been obtained from a Saturn x PR-9 hybrid population and, commencing with 1990, has been cultivated in Krasnodar Kray. The vegetative period for VNIIR 8847 is 120-125 days in duration, producing 80-85 cm plants resistant to lodging. To date, average harvests have been on the order of 7.13 tons/ha with a grain yield of 69 - 71 percent.

#### Spring Barley Tselinnyy 213

917C0324G Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 6, Nov-Dec 90 pp 36-37

[Article O. S. Khorikov, N. A. Kravchenko and R. I. Tereshchenko, cand. agricult. sci., All-Union Scientific Research Institute for Grain Crops]

UDC 633.16''321'':631.526.32

[Abstract] A new strain of spring barley designated Tselinnyy 213, representing a variety of Medicum, has been developed. The grains are yellow, oval, with a weight of 50-55 g/1000 grains. The plants attain a height of 80-90 cm and are above-average in resistance to

lodging, salinity, and have yielded average harvests of 1.84 tons/ha. Since 1989 Tselinnyy 213 has been cultivated in the southern zone of Kurgan Oblast.

#### Spring Barley Medicum 85

917C0324H Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 6, Nov-Dec 90 pp 37-38

[Article by A. A. Gryaznov, cand. agricult. sci., Kustanay Agricultural Scientific Research Institute, and M. I. Tretyakov, Inspectorate, State Commission for Crop Testing in Kustanay Oblast, Kazakh SSR State Agricultural Industry]

UDC 633.16''321'':631.526.32

[Abstract] A new variety of spring barley named medicum 85 has been derived from Odessa 36 x Ethiopian hybrids. Medicum 85 has a vegetative period of 57-93 days and provides average harvests of 4.10 tons/ha in favorable years. Medicum 85 tolerates salinity well; in 1989 and 1990 Medicum 85 has been cultivated in Northern Kazakhstan and Penza Oblast.

#### Winter Triticale Amfidiployd 60

917C0324I Moscow SELEKTSIYA I SEMENOVODSTVO in Russian No 6, Nov-Dec 90 pp 38-39

[Article by G. S. Gorban, cand. agricult. sci., Ukrainian Scientific Research Institute of Plant Sciences, Selection and Genetics]

UDC 633.11+633.14)''324'':631.526.32

[Abstract] Field trials with Amfidiployd 60, a new variety of winter triticale, conducted largely in Ukraine has yielded average harvests on the order of 6.09 tons/ha, improving on standard triticale varieties by ca. 0.86 tons/ha. Amfidiployd 60 produced strong 85-100 cm stems resistant to lodging, and grain weighing 43.5 - 57.5 g/1000 seeds with a 13.0 - 14.8 percent protein content. The variety is resistant to powdery mildew and smut, but somewhat less resistant than wheat to root rot and is occasionally affected by brown rust. Optimum sowing times correspond to the first part of winter wheat sowing season.

**Biosynthetic Activity of Wood-Destroying  
Basidiomycetes in Submerged Culture**

917C0294A Leningrad MIKOLOGIYA I  
FITOPATOLOGIYA in Russian Vol 24 No 5, Nov 90  
(manuscript received 2 Jan 90) pp 377-384

[Article by A. N. Kapich, Chair of Microbiology,  
Moscow State University imeni M. V. Lomonosov]

UDC 582.287:58.095

[Abstract] The means by which mycelium from wood-destroying basidiomycetes accumulates in the basic cellular components were investigated on 59 species (121 strains) from 12 families of wood-destroying basidiomycetes of the orders *Agaricales* and *Aphyllphorales*. The results demonstrated that there was very little difference in the amount of protein that accumulates in the mycelium of wood-destroying basidiomycetes. In addition, it was also shown that basidiomycetes producing a white rot synthesized 1.5-fold more protein in comparison with the fungi producing a brown rot, which was

attributed to the fact that the former grows well in conditions of intensive cultivation. Also compared in this study was the biosynthetic activity of wood-destroying basidiomycetes with respect to their systemic status and ability to destroy lignin. It was shown that the mycelium protein content varies substantially depending on the composition and growth phase of the culture, with the true protein concentration demonstrated to be a function of the absolute concentration of all amino acids. While differences between the fungi in the *Aphyllphorales* and *Agarcales* orders are negligible, comparison of the physiological traits of individual fungi revealed substantial differences in the amounts of carbohydrates and lipids in mycelium extracellular polysaccharides and the effectiveness of their biosynthesis. In conclusion, it was shown that the white rot-producing basidiomycetes have a higher carbohydrate concentration and more active synthesis of extracellular polysaccharides, while brown rot-producing basidiomycetes have a higher lipid concentration. Figures 3; tables 5; references 26: 15 Russian, 11 Western.

**Drug Resistance and Plasmid Profiles of DNA of *Shigella dysenteriae* 1 in the USSR and Abroad***917C0250A Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 21 Aug 89) pp 3-7*

[Article by Yu. P. Solodovnikov, O. N. Yakovleva, and T. G. Narizhnaya, Central Scientific Research Institute of Epidemiology of the USSR Ministry of Health; All-Union Center for Shigellosis, Moscow]

UDC 579.842.15:579.252.5

[Abstract] After a virtual absence for decades, shigellosis reappeared in the USSR in the early 1980s, with *S. dysenteriae* 1 isolated in certain areas several years in a row and the infection now endemic to the USSR. In an effort to determine the principal routes of the infection's entry into the country and to ascertain the extent of the danger presented by the higher drug resistance of the pathogen, the researchers performed a comparative study of DNA plasmid profiles and drug resistance of 62 strains of *S. dysenteriae* 1 isolated in the Soviet Union in 1986-1988 and of eight strains obtained from India. The study included an examination of the sensitivity of the strains to antibacterial drugs and their ability to transmit the resistance determinant (the R plasmid) in conjugative crossing. Most of the 62 domestic strains were isolated in Uzbekistan, and virtually all of the 62 were resistant to tetracycline and chloramphenicol. A considerable number demonstrated resistance to streptomycin; one-fourth of the total number of strains were resistant to ampicillin. The *S. dysenteriae* 1 strains from India showed multiple resistance and were distinguished by a marked resistance to ampicillin. Genetic analysis identified nine plasmid profiles, principal among them a profile of 140, 6, 4, 2 MD and another of 140, 35, 6, 2. The main route of entry into the USSR is Afghanistan, whose shigellosis is, in turn, "imported" primarily from India. References 4: 2 Russian, 2 Western.

**Certain Epidemiological Aspects of the Entry of Cholera into Uzbekistan in Recent Years***917C0250F Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 15 Oct 89) pp 58-60*

[Article by S. M. Mukhamedov, V. G. Seredin, M. V. Inzhevato, Ye. Yu. Kocherovskaya, R. K. Shadmanov, A. I. Kozlov, and D. L. Shmerkevich, Uzbek Antiplague Station of the USSR Ministry of Health, Tashkent]

UDC 616.932-036.2(575.1)

[Abstract] An epidemiological investigation of the entry of cholera into Uzbekistan revealed that virulent strains of *Vibrio cholerae* (tox<sup>+</sup>, Hly<sup>+</sup>), as well as nontoxigenic strains (tox<sup>-</sup>, Hly<sup>+</sup>), are being brought in, which leads the researchers to consider Uzbekistan a high risk area. The

transmission factors in the process include humans, as well as river water, hydrobionts, and wintering birds. Based on reports filed between 1968 and 1988, the researchers assert that air transport facilities play a large role in the process. However, in cases of illness or carriage of the disease that were due to tox<sup>-</sup> variants of *V. cholerae*, no cases of infection were noted among those who came in contact with the carriers or the infected individuals. References 5: 4 Russian, 1 Western.

**Use of Flu Vaccine and Remantadine for Protection Against Influenza at Industrial Enterprises***917C0250G Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 29 Jun 89) pp 79-83*

[Article by I. A. Malchikov, A. V. Slobodenyuk, Sverdlovsk Scientific Research Institute of Viral Infections, RSFSR Ministry of Health]

UDC 616.98:578832.1]-085.371:578.8321]-039.71

[Abstract] Consistently high flu morbidity levels at industrial enterprises are attributed primarily to poorly developed immunization tactics that do not take into account resistance to acute respiratory infection (ARI) or patient immunization history. In a study of the epidemiological efficacy of flu vaccines and remantadine (administered to those with contraindications for flu vaccine), the researchers observed workers at two large industrial enterprises in Sverdlovsk between 1980 and 1987. Individuals receiving flu shots were broken into three groups on the basis of frequency of ARI symptoms between July and June. In 1983-1985, the first group consisted of individuals who had had no flu symptoms the previous year; the second group, those who had exhibited flu symptoms once during the previous year; and the third group, those who had had symptoms two or more times. In the flu season of 1985-1986, the groups were based on incidence of ARI over the two years preceding vaccination; in 1986-1987, they were based on ARI incidence over the preceding three years. Within each group, some were vaccinated with inactivated vaccine, others received intranasal live vaccine. In the autumns of 1985 and 1986, group 3 individuals were administered both inactivated vaccine and live vaccine. The inactivated vaccines were two-component commercial vaccines prepared from viral strains A/Leningrad/51/1 (H1N1) and A/Texas/1/77 (H3N2), or A/Kiev/59/79 (H1N1) and A/Leningrad/385/80-R (H3N2), or A/Chile/1/63 (H1N1) and A/Philippines/2/82 (H3N2). The live vaccine was A/17/F/43/3 (H3N2). The researchers found that annual use of the inactivated vaccine over a three-year period lowered the number of seroconversions from 75 percent to 26 percent in those vaccinated against A(H1N1) and from 79.3 percent to 38.8 percent in those vaccinated against A(H3N2). Lengthening the interval between vaccinations to two years or alternating with inactivated and live vaccines

resulted in an increase of seroconversions to 64 percent from 57.8 percent. Generally, the prophylactic efficacy of inactivated vaccine declined after the third vaccination, although individuals reporting frequent ARI were afforded protection when given both inactivated and live vaccine or when those vaccines were alternated. After one-time administration of live vaccine to individuals who had been vaccinated with inactivated vaccine three times or more before, seroconversions were at a level of 57.1 - 58.8 percent in seronegative individuals, with a 1.7-fold decline in influenza and ARI morbidity. Daily administration of remantadine reduced flu morbidity 1.5- to 1.8-fold in those with vaccination contraindications, and 2.3-fold in those who had received inactivated vaccine. References 8: Russian.

### Basing a Diagnostic Test System on Magnetic Sorbents and Liposomes

917C0250H Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 13 Sep 89) pp 103-106

[Article by I. V. Vladimtseva, N. G. Plekhanova, V. I. Smirnova, and V. I. Zakrevskiy, Volgograd Scientific Research Antiplague Institute]

UDC 616.98:579843.94]-078.33

[Abstract] Recent research pointing to the benefits of the use of liposomes in immune diagnostics and to the advantages of solid-phase diagnostic test systems such as magnetic sorbents prompted the researchers here to study the possibility of using liposomes and magnetic sorbents in the design of diagnostic test systems based on antigen-antibody interaction. Capsule antigen of the

plague pathogen was isolated from *Y. pestis* EV, and immune sera against the antigen were produced with two cycles of immunization of rabbits with complete Freund adjuvant. Immunoglobulins from the sera were then extracted with polyethyleneglycol. The serological properties of the antigen preparations and the immunoglobulins were studied in immunodiffusion (ID) and in indirect hemagglutination tests. Antigen-containing, luminescing liposome preparations produced by phase reversal were characterized in terms of the antigen activity in them in ID and hemagglutination. A microgranulated polyacrylamide magnetic sorbent produced by emulsion polymerization was used as the solid-phase carrier. The capsule antigen was used as the ligand of the solid-phase carrier. It had a protein concentration of 400 µg/ml and a serological activity of 1:64 in ID and 1:128,000 in hemagglutination. Covalent immobilization of the antigen onto the magnetic spherical granules of the polyacrylamide resulted in a magnetic sorbent with immunochemical activity after exposure to luminescing plague immunoglobulins at 1.45 + 0.21 V. The *Y. pestis* capsule antigen immobilized in the liposome membrane yielded a positive result in hemagglutination with an immunoglobulin test kit in a titer of 1:12,800 and in ID in a dilution of 1:16. The concentration of the fluorescing marker in the membrane varied from 150 µg/ml to 700. The principle used by the researchers in designing their test system consisted in concentrating the analyte on the surface of the magnetic sorbent containing the bioselective ligand, with subsequent identification of the immobilized analyte with immunofluorometry that used luminescing immunoliposomes. They named the test system the solid-phase immunofluorescent liposomal method. The researchers studied the activity of immunoglobulins in eight homologous plague sera and found their method to be effective. Tests in nine heterologous sera were negative, indicating high specificity. Figures 1; references 14: 8 Russian, 6 Western.

### Creation of an Integrative Expression Vector and Its Use For Introduction of the Recombinant Human Alpha-Interferon Gene Into Plants

917C0284A Moscow GENETIKA in Russian Vol 26  
No 12, Dec 90 (manuscript received 17 Jul 90)  
pp 2111-2121

[Article by S. P. Smirnov, E. Kh. Teverovskaya, L. V. Krashenninnikova, and V. A. Pukhalskiy, Institute of General Genetics imeni N. I. Vavilov, USSR Academy of Sciences, Moscow]

UDC 575.11

[Abstract] Although the list of selective markers used in vectors is growing, many of the plant vectors that have been found recently are inaccessible because of commercial restrictions or because of their narrowly targeted design. That prompted the researchers here to design a universal vector with a broad spectrum of application, a task that led to the choice of the strong constitutive promoter 35S from the genome of cauliflower mosaic virus for use in the expression cassette and a selective marker for resistance to kanamycin that would directly screen transgenic plants. The vector pST6 was used for introducing the recombinant human  $\alpha$ -interferon gene into the tobacco plant genome and for effecting its expression in the plant cells. That vector has a unique BamHI site for cloning foreign genes into the expression cassette. The presence of the neomycinphosphotransferase II gene under the control of the  $P_{NOS}$  promoter enables the selection of transformed plant cells and tissue on a medium with kanamycin. The location of left and right signal 25-bp repeaters makes it possible to use various types of Ti-plasmids coupled with the pST6 vector despite the presence in them of similar signal repeaters.

In the first stage of the cloning into the pST6 vector, the interferon gene in the form of a 0.9-kbp PstI-EcoRI fragment was cloned in plasmid pUC19 with the addition to it of the polylinker from pUC19. In the plasmid that was produced, the interferon gene was between two BamHI sites. That BamHI fragment was then removed and cloned into a cleaved pST6 BamHI vector. A pST20

plasmid was created bearing the human interferon gene under the control of the 35S promoter.

The vector was then transferred into agrobacterium cells and integrated with plasmid pGV2260, which was used to infect the plant cells in leaf disk transformation. The IFLrA gene was cloned into the pST6 vector with techniques that did not destroy the integrity of the coding part of the gene. The results of the work indicated the normal expression of the transferred gene. Figures 6; references 16: 3 Russian, 13 Western.

### New Donor of Wheat Resistance to Stinking Smut (*Tilletiacaries* (DC) Tul.; *T. Levis* Kuehn.) and Its Genetic Basis

917C0284 Moscow GENETIKA in Russian Vol 26  
No 12, Dec 90 (manuscript received 23 Jan 89)  
pp 2186-2190

[Article by L. T. Babayants and L. A. Dubinina, All-Union Breeding and Genetics Institute, Odessa]

UDC 633.11:631.523:632.4

[Abstract] Unsatisfactory results in the breeding of wheat resistance to stinking smut are due to the extremely limited number of effective resistance genes and the generally low breeding value of resistance donors. The soft winter wheat *Ferrugineum* 220/85, however, which was developed in the department of phytopathology and entomology of the All-Union Breeding and Genetics Institute, exhibits resistance to wheat rust and various smuts and has high yields and good grain quality. With an eye to testing the suitability of the use of that form of wheat as a resistance donor, the researchers here conducted a four-year study of the genetic basis of its resistance. Working on the assumption that the *Ferrugineum* has certain of the  $Bt_5$ ,  $Bt_9$ , or  $Bt_{10}$  genes, or genes identical to them, they crossed it with the Yakor Odesskiy breed, which is extremely susceptible to stinking rust, and with certain monogenic lines. Analysis of the  $F_1$  and  $F_2$  hybrids of the *Ferrugineum*/Yakor cross indicated that resistance is controlled by two dominant, complementary genes. The  $F_1$  hybrids exhibited high resistance; in  $F_2$ , the ratio of resistant and susceptible plants was in agreement with the theoretical data. The researchers concluded that *Ferrugineum* 220/85 has genes other than  $Bt_{1-10}$  or  $Bt_z$ . References 3: 1 Russian, 2 Western.

### Current Burns Management in Disaster Medicine

917C0305A Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 62 No 10, Oct 90 (manuscript received 18 Jun 90) pp 25-28

[Article by L. I. Gerasimova, Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy, Moscow]

UDC 617-001.17-02:614.87]-08

[Abstract] A cursory review is presented on the management of burns within the scope of disaster medicine. Such cases are on the increase in the industrialized countries, currently reaching an incidence of 290-300/100,000 of population. Statistics for the USSR show an incidence of 384/100,000 in 1988, of whom 28.4 percent required hospitalization. Although the basic therapeutic approach has been standardized, success depends on accuracy in triage and institution. Patients in the 'light' category are those with burns of < 20 percent of their body surface in the absence of physical trauma and acute cardiovascular insufficiency. 'Severe' cases are represented by patients with burns covering 20 - 70 percent of the body surface, shock and/or acute respiratory and cardiovascular insufficiency. Finally, the 'extremely severe' caseload consists of preagonal or agonal patients with burns covering 70 - 100 percent of the body surface. Infusion therapy with colloids and physiological salines represents the immediate crucial component in the therapeutic strategy, supporting as it does vital signs and laying the ground for other forms of intervention. Plasma and protein infusions should be reserved for subsequent measures at specialized centers where a comprehensive multi-modality approach can be utilized.

### Prehospital Pain Control in Disaster Medicine

917C0305B Moscow TERAPEVTICHESKIY ARKHIV in Russian Vol 62 No 10, Oct 90 (manuscript received 13 Mar 90) pp 34-38

[Article by L. L. Stazhadze, B. V. Chetverushkin, T. F. Borovkova and A. O. Kokh, Scientific Research Institute of Emergency Medicine imeni N. V. Sklifosovskiy, Moscow]

UDC 616-001.3/6-06:616.8-009.7]-085.211/212

[Abstract] Pain control in the practice of disaster medicine can be divided into two stages: anesthesiologic assistance rendered before hospitalization and during hospitalization. In general, per os administration of non-narcotic analgesics in combination with antihistamines and benzodiazepines has been found fairly effective in pain control prior to hospitalization. However, surveys in Moscow, Ufa, Yerevan, Gorkiy and other large Soviet cities have shown undue reliance on less effective measures involving narcotic analgesics, usually without use of antihistamines. During transport of the injured patients nitrous oxide has been shown to be extremely efficacious, exceeding the benefits obtained with morphine in pain control. For example, a combination of 20 percent nitrous oxide + 80 percent oxygen has been shown to be equivalent to 16 mg of morphine, while 80 percent nitrous oxide + 20 percent oxygen provides a level of pain control seen with 65 mg of morphine. However, use of nitrous oxide prior to hospitalization is contraindicated in cases of hemorrhage, heart failure, marked respiratory insufficiency and advanced age. Detailed analysis of individual clinical cases is required for implementation of the most rational pain management chemotherapy in combination with other forms of support. Specifically, care should be exercised in the selection of agents with minimal side effects and sparing of the immune system. References 3: 2 Russian, 1 Western.

### Mechanism of Resistance of Methicillin-Resistant *Staphylococcus aureus* to Phages of the International Collection

917C0250B Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 21 Oct 89) pp 11-14

[Article by V. S. Zuyeva, O. A. Dmitrenko, Ye. A. Krupina, N. G. Belikov, and L. N. Nesterenko, Scientific Research Institute of Epidemiology and Microbiology imeni N. F. Gamaleya, USSR Academy of Medical Sciences, Moscow]

UDC 579.861.2:579.252.55].08

[Abstract] Methicillin-resistant *S. aureus* (MRSA) consists of a group of strains whose common properties include the ability to spread rapidly in hospitals, multiple resistance to antibiotics, and, often, the absence of sensitivity to phages of the International Collection. With phage-typing the primary technique for differentiating MRSA, the researchers here sought to provide a theoretical basis for what has thus far been an empirical search for new phages by identifying the mechanism underlying the MRSA phage-resistance. They studied 20 MRSA isolated in Moscow hospitals in 1976-1978. All the cultures were resistant to penicillin, streptomycin, tetracycline, chloramphenicol, and erythromycin. The strains were all typed by phage 85 only and were broken down into three groups: A, which contained strains 947 and 1007, typed in an RTD concentration; B, containing strains 1, 3, 4, 9, 64, 241, 359, 489, 575, 846, 1054, and 1055, typed in RTD-100; and C, which contained strains 5, 320, 378, 419, 746, 756, 809, 826, 829, 861, 941, and 1039, which were not typed. The effectiveness of phage 85 multiplication was four- to seven-fold greater in groups B and C than on the initial host strain PS 85. The researchers found that resistance to phage 85 was due to the presence of a restriction-modification system in the cell. Figures 1; references 13: 4 Russian, 9 Western.

### Morphological Description of Mucilaginous Variants of *Pseudomonas pseudomallei*

917C0250D Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 10 May 89) pp 41-45

[Article by V. I. Kapliyev, I. I. Denisov, and V. Ya. Kurilov, Volgograd Scientific Research Anti plague Institute]

UDC 579.841.11:579.23

[Abstract] Electron microscopy and electron cytochemistry were used to study the culture and morphological properties of mucilaginous colonies of *P. pseudomallei*. Strains 102, C-141, 800, 51274, 56738, 56872, 57576, and 59361 were maintained on nutrient agar with 4 percent glycerin. Culture properties were studied on a native nutrient Difco agar or on that agar with 4 percent glycerin, glucose, or saccharose. The strains of the melioidosis pathogen and the smooth and rough variations formed mucilaginous colonies that appeared after

two days of growth (primary colonies). They were large and hemispherical, with smooth, shiny surfaces and clean edges. After 3 - 4 days of growth, sliming began on the smooth and rough colonies, with a deterioration of the two-day properties (secondary colonies). The mucilaginous material of the primary colonies was found to be of a polysaccharide nature, that of the secondary colonies was primarily the product of the cytoplasmic content of cells undergoing destruction. The polysaccharide material was found to help in the formation of pseudocapsules and microcolonies. Figures 1; references 14: 4 Russian, 10 Western.

### *Fusarium sporotrichiella* Bilai Monosporic Culture Production of T-2 Toxin and Pigment Production Intensity

917C0294B Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 24 No 5, Nov 90 (manuscript received 8 Jun 89) pp 425-428

[Article by I. B. Kuvayeva, E. V. Boltyanskaya, and I. B. Bykova, Nutrition Institute, USSR Academy of Medical Sciences, Moscow]

UDC 582.288.45:576.8.097.29

[Abstract] The monosporic variants of the highly toxic and heavily pigmented strain of *Fusarium sporotrichiella* 53315 were investigated in order to determine how widely the toxigenic properties are varied among representatives of *Fusarium* fungi as a function of their pigmentation. The monosporic variants of *F. sporotrichiella* were cultivated at 20°C and the content of T-2 toxin in the extracts from these variants was determined with a microbiological technique using a *Saccharomyces lactis* BKM Y-459 yeast culture. Visual assessment of the monosporic variants indicated that the pigmentation intensity changes dramatically in subsequent sowings. The results demonstrated that heavy producers of T-2 toxin displayed a great deal of color upon subsequent sowings while poor producers did not. These findings suggest that color may be used to judge grain quality. Tables 2; references 7: Russian.

### Coccidioidomycosis Pathogen Tropism to Lung Tissue

917C0294C Leningrad MIKOLOGIYA I FITOPATOLOGIYA in Russian Vol 24 No 5, Nov 90 (manuscript received 20 Feb 90) pp 428-430

[Article by V. S. Lesovoy and Ye. I. Prokofyeva, Volgograd Scientific Research Anti plague Institute]

UDC 616-002.828

[Abstract] The fate of coccidioidomycosis fungal cells injected into albino mice, hamsters, guinea pigs, and rabbits by various means (intravenous, intramuscular, intraperitoneal, subcutaneous, oral, intrahepatic, and intratesticular) was traced. The results demonstrated a distinct tropism of coccidioidomycosis cells to the lungs. These findings may find application in the development of a vaccine against coccidioidomycosis pneumonia. References 3: 1 Russian, 2 Western.

**Common Structure in Snake Neurotoxins (NT)  
and Thymopoietin (TP)**

917C0321A Riga IZVESTIYA LATVIYSKOY  
AKADEMII NAUK in Russian No 10, Oct 90  
(manuscript received 5 Mar 90) pp 95-104

[Article by N. G. Ievinya, V. Ye. Klusha, G. I. Chipens,  
Institute of Organic Synthesis, Latvian SSR Academy of  
Sciences]

UDC 577.15.025.3:547.96

[Abstract] An analysis was conducted on the primary structures of TP and 28 NTs isolated from terrestrial and marine snakes in order to determine the sequence responsible for competitive inhibition between TP and NTs in binding to nicotinic acetylcholine receptors. The data implicated the pentapeptide RVDLG at position 39-43, occurring before a disulfide bridge, in the conservative NT region as constituting the binding site shared with TP and other bioactive peptides. In addition to shifts in the B-pleated sheet structure, a common difference among the NTs involved D-E substitutions in the pentapeptide sequence. Figures 6; tables 3; references 32: 10 Russian, 22 Western.

**Screening Furan Derivatives for Novel Pesticides**

917C0321B Riga IZVESTIYA LATVIYSKOY  
AKADEMII NAUK in Russian No 10, Oct 90  
(manuscript received 9 Jul 90) pp 116-119

[Article by K. Venters, M. Trushule, N. Rozhkova and E.  
Lukevits, Institute of Organic Synthesis, Latvian SSR  
Academy of Sciences; All-Union Scientific Research  
Institute of Chemical Plant Protection]

UDC 632.9: 547.72

[Abstract] Screening studies were conducted on carbonyl derivatives of furan in search for novel insecticides, herbicides, plant growth regulators, fungicides, bacteriocides and antiseptics. The study led to the identification of 3,3,3-trifluoro-1-(5-nitro-2-furyl)-1-propene, 1-(2-furyl)-2-nitroethene and 3-(5-nitro-2-furyl)-2-propene nitril derivatives as possessing insecticidal characteristics. A number of nitrofurans were shown to be antifungal. In addition, 3,3,3-trifluoro-1-(5-nitro-2-furyl)-1-propene was also found to be equivalent to salicylanilide as an antiseptic. Tables 3; references 7: 5 Russian, 2 Western.

**Visual Perception Training and Changes in Autonomic and Psychophysiological Indicators**

917C0150A Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 16 No 6, Nov-Dec 90 (manuscript received 28 Jul 88) pp 93-96

[Article by V. V. Gorbunov, N. V. Makarenko and V. V. Dosychev, Kiev Mechanical Plant imeni O. K. Antonov]

UDC 613.693

[Abstract] A correlation study was conducted on EKG parameters and performance on a visual perception test in relation to the number of training sessions. Testing involved presentation of an increasing information load, using previously published techniques [Gorbunov, V. V., et al., ZhVND, 28(1): 41, 1978]. The results demonstrated that three training sessions ensured peak performance on the visual test. However, this level of training was accompanied by maximum stress as indicated by EKG monitoring (heart rate and variation in R-R intervals). Five training sessions were required for stress abatement with retention of peak performance, indicating a positive correlation between onset of more efficient information processing mechanisms with task repetition and abatement of stress. Tables 3; references 11: 10 Russian, 1 Western.

**Early Electromyographic Detection of Radiation Exposure in Man**

917C0150B Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 16 No 6, Nov-Dec 90 (manuscript received 28 Jun 89) pp 135-141

[Article by Ye. A. Andreyeva, F. S. Torubarov, O. Ye. Khutorskaya, S. N. Smirnova and P. V. Chesalin, Moscow]

UDC 681.32.06-192

[Abstract] Computerized spectral analysis was conducted on envelope EMG of 33 men and one woman subjected to various levels of irradiation as a result of the Chernobyl nuclear power plant accident, in order to test the diagnostic utility of EMG. The subjects ranged in age from 17 - 55 years and were examined 8 - 10 months after exposure. The EMG recordings were obtained from m. extensor carpi radialis longus and m. tibialis anterior; control data was derived from 28 unexposed individuals. Analysis of the histograms demonstrated that telling differences from the norm were apparent only in subjects exposed to low-level irradiation, and consisted of a shift of peak frequencies from the 0-25 to 25-40 Hz band in the case of both muscles. In quantitative terms, the  $R_{1,3}$  value was  $\geq 0$  for the control subjects and  $R_{1,3} < 0$  for the patients with low-level exposure. Amplitudes were not affected. These findings indicate that analysis of envelope EMG patterns may have diagnostic utility in identifying individuals subjected to low-level irradiation

insufficient to induce acute radiation sickness. Figures 3; tables 1; references 7: 6 Russian, 1 Western.

**Functional Asymmetry of Paired Organs and Pilot Performance**

917C0150C Moscow FIZIOLOGIYA CHELOVEKA in Russian Vol 16 No 6, Nov-Dec 90 (manuscript received 9 Mar 89) pp 142-148

[Article by V. A. Bodrov, T. A. Dobrokhotova and A. G. Fedoruk, Institute of Psychology, USSR Academy of Sciences, Moscow]

UDC 613.693+612.821

[Abstract] Several hundred pilots were examined for functional laterality of paired organ systems (hand, visual, auditory, cerebral hemispheres, upper and lower extremities) in conjunction with job performance and pilot rating. The results demonstrated unequivocal positive correlation between right-side dominance (particularly of extremities, vision, and hearing) and excellence in performance and high ratings over the results obtained with pilots with left-side predominance or functional symmetry. In part, the outcome was predicated on early elimination of individuals with left-side dominance and functional symmetry from pilot training programs because of poor performance. In addition, cerebral laterality was seemingly reinforced by training and occupational experience in pilots with natural right-side dominance, quite contrary to the experience with poorly rated pilots. Accordingly, these observations illustrate the validity of laterality studies in assessing pilot performance and job fitness. Tables 3; references 17: 16 Russian, 1 Western.

**Adrenocortical Effects of Thymosin (Fraction 5) and T-Activin in Mice**

917C0151A Moscow PROBLEMY ENDOKRINOLOGII in Russian Vol 36 No 6, Nov-Dec 90 (manuscript received 16 Dec 88) pp 76-79

[Article by Ye. V. Ignatyeva, V. M. Chesnokova and L. N. Ivanova, Laboratory of Physiological Genetics, Institute of Cytology and Genetics, Siberian Department, USSR Academy of Sciences, Novosibirsk]

UDC 615.361.438.015.4.612.453/076.9

[Abstract] In vivo and in vitro studies performed with mature male BALB/c mice demonstrated that the thymus exercises regulatory control over the adrenal cortex. Administration of thymosin (fraction 5; 1  $\mu$ g i.p.) resulted in a significant rise in plasma corticosterone within 3 h, an effect precluded by administration of dexamethasone (10  $\mu$ , i.p.) 0.5 h before thymosin. In vitro incubation studies, however, demonstrated that thymosin did not act directly on the adrenal cortex. Administration of T-activin (0.1, 0.5 and 2.5  $\mu$ , i.p.) led to a dose-dependent but insignificant depression of

plasma corticosterone levels, while in vitro studies revealed dose-dependent reduction in corticosterone production. Accordingly, the data indicate that regulatory control of the thymus over the adrenal cortex is multifaceted and constitutes an important link in determining immune homeostasis of an organism. Figures 4; tables 1; references 14: 9 Russian, 5 Western.

### Dual Nature of Photoreception: Theoretical Enhancements

917C0155A Kiev *OFTALMOLOGICHESKIY ZHURNAL* in Russian No 2, 1990 (manuscript received 3 Jan 88) pp 104-105

[Article by A. S. Novokhatskiy, dr. med. sci., Odessa Order of the Red Banner of Labor Scientific Research Institute of Eye Diseases and Tissue Therapy imeni Acad. V. P. Filatov]

UDC 612.843.3.01

[Abstract] Studies on several hundred subjects with normal vision and patients with nutritional and essential hemeralopia have provided a theoretical basis for introducing revisions into the dual nature (rods and cones) of photoreception. Clinicophysiological studies on scotopic illumination and the Purkinje phenomenon led to interpretations suggestive of additional putative mechanisms of photoreception. The interpretations appear to be consonant with mechanisms designated as a direct dual-component optic disk mechanism and a rhodopsin-mediated single component mechanism. The former depends on quasicrystalline optic disk membranes and is independent of visual pigments. It is responsible for quantitative (brightness) and qualitative (wavelength) characteristics of light perception and applies to photopic illumination, while the latter mechanism functions in low-intensity (scotopic) illumination when optic disk membranes are unresponsive. In addition, an intermediate mechanism of photoreception—transitional between the two just described—appears to operate in situations in which light is of sufficient intensity to be registered by the optic disk but of insufficient intensity to cause complete dissociation of rhodopsin, i.e., conditions responsible for the Purkinje phenomenon. In the latter case, i.e., that of mesopic vision, photoreception is dependent on a weak rhodopsin filter. Figures 2; references 13: 4 Russian, 1 Polish, 8 Western.

### Dynamics of Na<sup>+</sup> and K<sup>+</sup> Balance in Erythrocytes and Blood Plasma in Control Rats Deadapted to High Altitudes in Response to Onset of Alloxan Diabetes

917C0291A Frunze *ZDRAVOOKHRANENIYE KIRGIZII* in Russian No 5, Sep-Oct 90 pp 18-21

[Article by E. M. Kuchuk, G. D. Stepanenko, K. A. Bozumova, and D. Z. Zakirov, Chair of Biochemistry,

Kirghiz State Medical Institute; Laboratory of Experimental and Clinical Pathology and Therapy, Central Scientific Research Laboratory]

[Abstract] The transmembrane distribution of sodium and potassium ions in erythrocytes and blood plasma in 130 outbred albino male rats (140-170 g) adapted to high altitudes was investigated in response to the animals' deadaptation to high altitudes and simultaneous onset of alloxan diabetes. Upon return from a 45 day stay at 3,200 m above sea level, the experimental group was administered 170 mg/kg of alloxan intraperitoneally to cause diabetes. The results demonstrated that on day 15 after returning to the lower altitude, the diabetic rats given alloxan had a blood glucose level of 7.8 mmol/l as opposed to 16.2 mmol/l for the control group. The mortality rate for the experimental group was also eight- to nine-fold lower than in the control group. In addition, in the control and alloxan diabetic animals that were highly resistant to hypoxia, the electrolyte balance indicators differed little from one another. Moreover, the sodium and potassium contents in the erythrocytes and blood plasma were about the same in both the hypoxia-resistant and hypoxia-sensitive animals, but shifts in the hypoxia-sensitive animals were more pronounced, the animals exhibited a more serious course of diabetes, and they had a significantly higher mortality rate. In short, the administration of alloxan to the experimental group resulted in less pronounced changes in the electrolyte balance and carbohydrate metabolism. These findings suggest that deadaptation and adaptation to altitude enhance the body's resistance to external factors. In addition, the more favorable course of diabetes is evidently due to a rearrangement in the functional condition of the hypothalamic-hypophyseal-adrenal system and structural and functional reorganization of the cell membrane. Tables 3.

### Age and Muscle Tissue in Adaptation to Heavy Loads in Rats (Light Microscopy Data)

917C0291B Frunze *ZDRAVOOKHRANENIYE KIRGIZII* in Russian No 5, Sep-Oct 90 pp 21-22

[Article by B. S. Mambetaliyev, A. B. Botombekova, N. A. Vlasova, and T. B. Gerasimova, Physical Training Institute, Kiev; Kirghiz State Medical Institute]

[Abstract] Light microscopy of the gastrocnemius muscle tissue from albino male rats aged 2 weeks and 12 months that were raised at 760 m and 3,200 m above sea level was employed to determine the degree of adaptation to heavy physical stresses. Training consisted of ten 5-day microcycles with 2-day breaks between the cycles. The results demonstrated that weights applied to the muscles did not cause any pathological changes in the muscle structure of the adult rats, although the diameter of the muscle fibers did increase. The young rats, however, did not exhibit an increase in the muscle fiber diameter, though they exhibited 34.9 percent more nuclei in the muscle fibers.

**Effect of Corona Discharge in Mountains on Nonapeptide Hypothalamic-Hypophyseal Neurosecretion System and Differential Blood Count**

917C0291C *Frunze ZDRAVOOKHRANENIYE KIRGIZII in Russian No 5, Sep-Oct 90 pp 25-27*

[Article by E. A. Yangalycheva, M. V. Balykin, and K. K. Koychiyev, High Altitude Physiology and Experimental Pathology Institute, Kirghiz SSR Academy of Sciences]

UDC 612.4325612.8+615.385.3:537.52(32.03)

[Abstract] The function of neurosecretory centers of the anterior hypothalamus and leukocytic cellular elements in the onset of stress with concomitant oversteering of the processes of synthesis and elimination of neurohormones was investigated in albino pubertal male rats (200-220 g). Stress in the form of factors of the associated corona discharge of VL [as published] of 220 and 500 kilovolts was applied to groups of animals (control, non-adapted, and adapted to high altitude) in the summer to study the nonapeptidergic centers of the anterior hypothalamus and leukocyte morphology. The

animals were subjected to monophasic VL of 220-500 kv in exposures of 1, 4, or 8 hours for 3 or 5 days. The results demonstrated that group 3 animals exhibited less release of neurohormones into the hypothalamic hypophyseal neurosecretory system in response to a VL of 500 kv. In addition, group 3 rats subjected to 5 days of 4 or 8 h per day of exposure also presented with regressive alteration in the cellular nuclei and a decrease in size, evidently resulting from depletion of the neurosecretory cell function. It was also shown that animals in groups 2 and 3 subjected to 8 h per day exposure for 5 days exhibited diminished motor activity and elevated static reflex, probably stemming from changes in the cortex dynamics and physiological accumulation of the negative effect of the corona discharge. The results also demonstrated that the wave-like changes in the RNA that do not coincide with high altitude adaptation phases are probably the result of varying degrees of activation of the structures of supraoptic nuclei. Moreover, the criteria for assessing the general adaptation reaction in rats in response to the effect of the factors accompanying the corona discharge of VL suggest that the most favorable in a prognostic sense is the stage of stress depletion. Tables 1.

### Epidemiology of Cerebrovascular Disease in USSR

917C0292A Moscow *ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA* in Russian Vol 90 No 11, Nov 90 (manuscript received 28 Jul 89) pp 7-10

[Article by Yu. Ya. Varakin, M. K. Kipiani, N. Z. Molla-Zade, V. Ye. Smirnov, A. A. Skoromets, V. A. Sorokoumov, V. L. Feygin, V. V. Shprakh, E. E. Yusupov, N. L. Burdukovakaya, T. Ye. Vinogradova, V. K. Volkov, G. V. Gornostayeva, M. V. Paniyeva and K. M. Sakashvili, Scientific Research Institute of Neurology, USSR Academy of Medical Sciences, Moscow; Chair of Neurological Diseases and Physical Therapy, Azerbaijan Institute of Advanced Training for Physicians imeni A. Aliyev, Baku; Chair of Neurology with a Neurosurgical Course, Irkutsk Institute of Advanced Training for Physicians; Chair of Neurology with a Neurosurgical Course, First Leningrad Medical Institute imeni I. P. Pavlov; Institute of Therapy, Siberian Department, USSR Academy of Medical Sciences, Novosibirsk; Scientific Research Institute of Clinical and Experimental Neurology imeni Acad. P. M. Saradzhishvili, Georgian SSR Ministry of Health, Tbilisi]

UDC 616.133.33-036.2-07(47+57)

[Abstract] An epidemiologic survey was conducted on the type and incidence of cerebrovascular disease (CVD) in the USSR, encompassing 20- to 54-year-old males. Data derived for the cohort of 12,159 males revealed that the incidence of CVD ranged from 11.3 percent in Moscow to a high of 16.8 percent in Irkutsk, whereas the overall incidence for the entire population in those cities corresponded to 7.7 and 12 percent, respectively. Analysis of individual disease patterns revealed that 68 percent of the cohort presented with initial stages of cerebrovascular insufficiency, 25 percent with transient ischemic episodes, and 7 percent with stroke and other forms of vascular encephalopathy. In general terms, the data illustrate the much higher incidence of CVD in Siberia than in European regions of the USSR, with the Transcaucasion area occupying an intermediate position. Tables 1; references 8: Russian.

### Immunogenetic Correlates of Tick-Borne Encephalitis (TBE)

917C0292B Moscow *ZHURNAL NEVROPATOLOGII I PSIKHIATRII IMENI S. S. KORSAKOVA* in Russian Vol 90 No 11, Nov 90 (manuscript received 18 Jan 90) pp 38-43

[Article by L. O. Chernitsyna, V. F. Prokofyev, V. I. Konenkov and A. P. Ierusalimskiy, Laboratory of clinical Immunogenetics, Institute of Clinical Immunology, Siberian Department, USSR Academy of Medical Sciences; Laboratory of Neuroinfections, Department of Scientific Investigations and Modern Diagnostic

Methods in Clinical Medicine, Institute of Bioorganic chemistry, Siberian Department, USSR Academy of Sciences, Novosibirsk]

UDC 616.831-002-022.7:578.833.26]-022.39]-092:612.118.221.2

[Abstract] Immunogenesis studies were conducted on the correlation between the major histocompatibility complex and clinical course of TBE. The experimental cohort consisted of 110 patients (84 males, 26 females, 7-76 years) with TBE in Novosibirsk, with control HLA data derived from 140 healthy subjects (20-55 years). In general, data combining information on sex and two HLA antigens as markers made it possible to prognosticate the clinical course of TBE in 60 percent of the patients: a monophasic course was predictable in 53.5 percent of the cases and a diphasic course in 96.6 percent. However, sex differences were evident in the fact that prognosis on the basis of immunogenetic data was possible in 59.5 percent of the males and in 69.2 percent of the female patients. Accordingly, these findings show that analysis of the major histocompatibility complex provides clinically informative data in cases of TBE. Tables 4; references 11: 9 Russian, 2 Western.

### New "Solidarity" Fund to Aid Disaster Victims

917C0350A Moscow *SOVETSKAYA ROSSIYA* in Russian No 3, 4 Jan 91 p 4

[Article by N. Aleksandrova and R. Zhukova: "Solidarity Fund Established"]

[Text] The work of the Third All-Union Conference of the Soviet Charity and Health Fund, in which representatives of the 164 regional chapters participated, has been wrapped up in Moscow. The conference resolved to establish a bank for long-term public applied science and medical programs directed primarily at providing high quality products for the elderly, ill, and invalids and at providing them a number of services. The interregional programs will be financed by the Charity and Health Fund as well as by various republic funds.

The Charity and Health Fund will also participate in the construction of buildings for public rendering of medical services for the ill and invalids. In particular, the Fund resources will be used to modernize the orthopedic ward of the All-Union Scientific Research Institute of Prostheses Fitting and Engineering. Construction of the Children's Oncological Center in the city of Obninsk is beginning with the involvement of the Fund. Fund allocations will be used to procure medical equipment, medications, disposable syringes, and prosthetic devices in the USSR and abroad.

The Conference approved the establishment of an independent Solidarity Fund under the Charity and Health Fund. This new Fund is designated to build monetary resources for providing care for the victims of earthquakes, floods, and other catastrophes.

### Problems in Maternal, Infant Health

917C0350B Moscow SOVETSKAYA ROSSIYA  
in Russian No 3, 4 Jan 91 p 4

[Article by G. Bilyalidinova: "A Poor Record: Maternity Problems" by V. Zubkov, Chief Maternity Physician, as told to author]

[Text] "Vladimir Nikolayevich, let's begin with the statistics: During the past five years, more than 14,000 women have died in the maternity hospitals, and 200,000 newborns die annually. Almost 60,000 children are born with congenital and hereditary diseases. T. Akhunova from Aralsk asks, 'How can I go on living, and where can I get the strength? Of the ten children that I have born, only two are still living. The rest did not live even six months.' What can you tell her and other women?"

"Unfortunately, the situation is not getting any better. In order to become a mother, a girl should have a healthy lifestyle from childhood. By this I mean a balanced diet, moderate physical exercise, and a number of other factors. A future mother, equal in rights to men, has been "permitted" to work at night, lay asphalt, and hammer in spikes for the railroad. Carrying weights up to nine tons per shift has been legalized (the limit was just recently reduced to seven tons). For comparison I can say that in Japan, this limit is 700 kilograms.

Today, more than three million women work in hazardous conditions, more than 500,000 are employed in heavy physical labor, and four million work at night or in the mines. How can they bear normal children under these conditions?

A woman is a woman, and it is her direct responsibility to bear healthy children and be a healthy mother. But what do we do? One out of four women on the "Maternal Mortality" graph dies from an abortion, with this figure reaching one out of three in Russia. The index for the number of abortions per 100 women in our country remains among the highest in the world. Few of the oblast hospitals have gynecologic establishments. This deprives women, especially those in rural areas, of qualified medical care... The lack of equipment and shortage of drugs and disinfectants is becoming critical...

We must immediately contribute much more money to medicine and switch to a new budget-insurance means of financing this branch. For 1991-1992 the total expenses for public health should be raised from 30 billion rubles to 100 billion. And this is only the minimum for subsistence.

Unfortunately, the USSR and RSFSR Ministries of Health are delaying the issuance of documents for the transition to budget-insurance medicine. The new guidelines for the financial support of public health have already been published in the form of a proposal, but it is not known when they will become law and how the local government and factory leaders will receive them.

In 1991 we will only have 20 - 22 percent of the drugs needed as compared to what we have this year. The problem of disposable syringes is also critical.

Another aspect. We need to develop as soon as possible a system of three maternity leaves. A pregnant woman, in my opinion, should have three maternity leaves, rather than the current number of two. The first should be from the time that pregnancy is established to 13 weeks into the pregnancy, after which she may be permitted light work. The second leave should be given approximately four months after the first. The third leave should be after childbirth, at least 70 days for all mothers, and 84 for those with complications. In each maternity hospital there should be a ward where mothers and babies can stay together.

We have completely forgotten about the fathers. We need to think about offering the father a legitimate leave the first days after the mother and baby are released. Every woman knows that the most difficult days are the first days home from the hospital.

What would be the result of all this? Childbirth and pediatric service needs to have a separate line in the budget, and the incompetent drone-structures such as the municipal health departments that duplicate our work need to be eliminated. Local medical service should be subordinate only to the local Soviet.

### New Biotechnology Association for Pharmaceuticals Production

917C0350C Moscow MEDITSINSKAYA GAZETA  
in Russian 14 Dec 90 p 1

[Article by Yu. Stepanov: "Meet Biotekhprom"]

[Text] A presentation of the new scientific production association of the business cooperation "Biotekhprom" was held at the Expocenter on Krasnaya Presen. This is a volunteer union of enterprises and organizations that operates in the sphere of producing medicinal forms and developing prevention and therapy and dietetic nutrition products. The association plans to construct buildings for industrial and civilian use, provide services in the sphere of establishing and implementing programs, and also manufacture medical equipment.

"The principal goals of our association are the development and introduction of ecologically clean technology in the fields of chemistry and biology, the production of new drugs, and the improvement of their production," states its president A. M. Karpov, General Director of the Scientific Production Association "Biotekhnik". "It will also be involved in the development of automated equipment for the biotechnological production of the needs of medicine. The development of foreign economic activity will be accomplished on the basis of joint ventures and the implementation of products and services for export."

Among the nine founders of the new association are the USSR Ministry of the Medical Industry, the Scientific Production Associations "Biotekhnika", "Biomash", "Interpromstroy", "Inbel", "Sinteko", and enterprises in the RSFSR, Belorussia, Kazakhstan, Turkmenistan, and Uzbekistan.

### Polyclinic Head on Self-Financing

917C0350D Moscow *MEDITSINSKAYA GAZETA*  
in Russian 28 Dec 90 p 1

[Interview with P. M. Alekseyev, Chief Physician of Moscow Polyclinic No. 92 by A. Oskolkova: "Polyclinic for Lease"]

[Text]

[Oskolkova] "What do the medics and patients have to gain from a polyclinic that becomes leased?" We asked this question of P. M. Alekseyev, Chief Physician of Polyclinic No. 92 in the city of Moscow.

[Alekseyev] I am not yet sure whether the experiment will succeed. The agreement with the rayon health department was made for one year. At the end of the period we will report to the rayon deputies. But something in the polyclinic has already changed. There are new specialists that offer free services to the registered population. A paid ward has been opened. Here the costs are higher than in ordinary paid polyclinics, but lower than at the most inexpensive Moscow cooperative "Gip-pokrat".

[Oskolkova] Can you quote me the costs of some of these services?

[Alekseyev] A consultation with doctors of science specializing in urology, gynecology, proctology, etc., costs 13 rubles; with candidates of science costs 10 rubles, and with a doctor lacking a degree it costs eight rubles. Our costs for cosmetic surgery are comparatively high. So the cost of analyses is close to that of the paid polyclinics.

It may still be too early to talk about the change in quality. But the salary for our specialists still has not yet reached the subsistence wage.

[Oskolkova] And what do you think this subsistence wage should be?

[Alekseyev] I think that for a salary of 1,500 rubles I have the moral right to expect quality work from a doctor. Currently, the income allocated for paying the wages is divided equally among all the members of the collective. When we finally reach the level of the subsistence wage, the earnings will become differentiated.

[Oskolkova] But business can only be successful when most of the income is put into operation or invested. Am I correct?

[Alekseyev] Of course, we are planning to expand our activity. We have already opened a consignment store

for medical equipment. With our help, a therapeutic institution can exchange or sell equipment that is no longer needed. For this we only need them to send the technical documentation for the instrument with an evaluation statement from the commission. In this manner, we can not only make a profit, but also obtain needed equipment. The polyclinic is still turning only a small profit, so there have not been any problems. But a new tax law will complicate the investment system. For example, the tax on ten million rubles' profit will be five million. But it is possible that with an earning of one million rubles, we will have to pay three million in taxes. So, the amounts and direction of investment in many ways will depend on the recommendations of experienced specialists. For now we are planning to obtain medicinal herbs and drugs. We will procure some of them at the set prices, and others at reduced rates or free of charge in an order of philanthropy to distribute among our patients.

### Self-Financing Recommended for Pharmaceuticals Industry

917C0350E Moscow *MEDITSINSKAYA GAZETA*  
in Russian 28 Dec 90 p 1

[Article by V. Romanenko, Director of the central rayon pharmacy, Znamenka, Kirovograd Oblast: "How To Conquer the Deficit, or A View From the Pharmacy; first two paragraphs are *MEDITSINSKAYA GAZETA* introduction]

[Text] The situation the pharmacy was in has become critical. A drug catastrophe is predicted for 1991.

Seeing the clearly outlined position of *Meditsinskaya Gazeta* for correcting the current situation in public health as a whole and in pharmacy in particular, let us consider some ways of solving some critical problems in a controversial, but interesting view from the pharmacy counter.

Sick people count on getting everything prescribed by the doctor at the pharmacy. However, with the current supply of drugs, the only thing added to their diseases here is a sense of irritation at the pharmacists.

The working conditions of the pharmacists, 95 percent of whom are women, defy all criticism.

The change in the principle for setting prices for drugs and the dictates of the manufacturer through the wholesale prices have made one out of three pharmacies unprofitable, while the profit margin of the others is no more than five percent. Suffice to say that 10 million units of sterile solutions are prepared at the Minmed-prom enterprises, while 400 million units are made at the pharmacies free of charge.

The public ties the emergence of the country from the economic crisis with a market economy. The coming market spells death for the pharmacy, just like for the self-financing group. The materials recently received

mandating an increase in wholesale prices by 70 percent, electricity by 100 percent, and social insurance by 37 percent for a pharmacy system that has been operating on a self-financing basis since 1922 give no pleasure. They will ruin it completely.

Furthermore, the problem of collecting payment for the manufacture of drugs in the pharmacy has also not yet been solved. Many decades will be needed just to correct this flagrant economic illiteracy. Until recently, the rayon pharmacies were given an annual budget of 50,000 rubles profit. But a miscalculation of our economic activity shows a 400,000 ruble loss for 1991. There are 30,000 pharmacies in the country. The result is a 12 billion ruble loss!

There is not one country in the world with a social pharmacy system that has a government budget like ours.

The group egoism of the "green" movements against constructing new pharmaceutical factories and the shortage and outdated enterprises of the Minmedprom are the reasons for the drug crisis. But that does not make it any easier for us. Moreover, it will result in the complete elimination of a self-financing basis in the pharmacies, which means the elimination of the pharmacies themselves. So this is why 400,000 pharmacy workers are against any such "entry" into a market economy.

We think that satisfying the demand for drugs is only possible with the privatization of the pharmacy industry in respect with the law governing small enterprises and introduction of market relations into pharmacy. First of all, we need to put an end to the team administration system of manufacturing drugs in view of the monopoly held by the Ministry of the Medical Industry. Following the firms will be associations that unite the pharmaceutical factories, scientific institutes, and wholesale trade structures with the drugs. The organization system must be joint.

In order to attract capital, a favorable tax needs to be set for enterprises that manufacture the drugs and substances. Licenses for novel drugs, know-how, biotechnology, and gene engineering must be obtained, and economic priorities for chemical profile experimental productions of the USSR Academy of Sciences institutes must be established, especially in the development and introduction of drugs. These priorities will support small enterprises with the purpose of drawing them into the pharmaceutical market.

The pharmacies must operate only on a self-financing basis. The first essential condition is that of reorganizing the price setting of drugs and other items manufactured by the pharmacy. Realistic retail prices must be set for medicinal plants, and must be in respect with labor costs.

In my opinion, it would be a good idea to establish an independent government pharmacy inspection agency

that is subordinate to the Supreme Soviet of the republics. This agency exercises minimal intervention into the pharmacy's trade and financial activity. The rash, hard currency purchases of drugs must be eliminated, and the requisitioning of medical goods two years in advance must quickly be stopped.

Courses in business and marketing, clinical pharmacy, and alternative pharmacy (homeopathy and phytotherapy) must be incorporated into the institute programs in place of studying ideological dogma.

The USSR Council of Ministers could search for and issue hard currency for 3 - 5 years for the purpose of studying pharmacy in countries with a market economy and pass the costs on to the republics.

Our program possibly does not reflect anywhere near all of the ways of getting out of the drug impasse, and we are not even claiming truth in the latter instance. However, we believe that silently looking at the emptying pharmacy counters is amoral, at the very least.

#### Medical Psychologist Specialty Established

917C0350F Moscow SOVETSKAYA ROSSIYA  
in Russian 28 Dec 90 p 2

[Interview by N. Kuzina with panel of specialists: "Plus a Psychologist"]

[Text] A new specialty, medical psychology, will soon be appearing in the public health establishments. This decision was made at the joint collegium of the USSR Ministry of Public Health and the USSR State Committee on Public Education which was devoted to the problem of the status and emergency measures on the development of psychological service in the public health system. The priorities are: aid to children and adolescents, outpatient work, rehabilitation of patients with somatic and neuropsychological pathology, and urgent care.

The prolonged inattention to the problems of medical psychology, of course, did not contribute to the growth of well-trained personnel. The USSR State Committee on Public Education believes it to be important to increase their numbers and is ready to consider the respective proposals from the Ministry of Health. A number of measures for training medical psychologists and their thematic advanced training in the system of medical higher education institutions has been outlined.

There is a great deal of work to be done for the organization of the medical psychology service and its scientific and teaching support. This task has been given to A. A. Baranov, director of the Coordination Teaching Council and the USSR First Deputy Minister of Public Health. It was through his initiative that the problems of medical psychology enjoyed development.

The country's leading psychologists participated in preparing the collegium's resolutions. Here before you is an

opinion forum on medical psychology service from a small group of these specialists. Involved in the conversation are: L. I. Vasserman, doctor of medical sciences, director of the Clinical Psychology Laboratory, Leningrad Scientific Research Psychoneurology Institute imeni V. M. Bekhterev; V. V. Guldán, doctor of psychological sciences, director of the ward for Social and Psychological Problems of Drug Addictions, All-Union Scientific Center for Biomedical Problems of Drug Addiction, USSR Ministry of Health, and the chief non-staff medical psychologist of the USSR Ministry of Health; V. V. Nikolayeva, candidate of psychological sciences, docent of the Chair of Neuro- and Pathopsychology, Moscow State University imeni M. V. Lomonosov; and Yu. F. Polyakov, doctor of psychological sciences, professor of the leading chair of Neuro- and Pathopsychology, Psychology Department, Moscow State University imeni M. V. Lomonosov.

V. V. Guldán:

We have a paradoxical situation with medical psychology in our country. There is something of one; there are scientific schools of pathopsychology and neuropsychology known throughout the world and research is conducted. But you cannot get professional psychological help anywhere.

One of the main reasons for this situation is the underestimation of its social importance and potential for solving a wide array of preventive and therapeutic problems. This is tied to the illiteracy of the doctors in the field of medical psychology and the lack of the respective information and skills for offering the public professional psychological help. And the chief of these reasons is that there is no developed network of this service.

V. V. Nikolayeva:

The trust between the doctor and patient and the public health system and society has intensified the crisis significantly. The tie between the medical purpose and the patient's behavior and between the public health agency measures and the attitude of civilians toward them has disintegrated. It has been shown that it is impossible to force a patient into a rigid technical model of "doctoring" based on an anatomical and physiological approach. This situation, classical of psychosomatic medicine, was called a "machine" approach by Vityes and English in medicine as early as the 1930s. Its development stemmed from an even narrower specialization of doctors and abundance of modern, technically complex methods for diagnosis and treatment that were aimed at investigating the status of the somatic organs and functions of the remaining ones, without attention to the person as a suffering entity or living object.

Ignoring the individualized and humanitarian approach to the patient's personality is currently becoming a powerful stimulus for the development of alternative medicine in our country. While representatives of non-traditional medicine rather often have lesser skills than professional doctors, they pay more attention to the

human personality of the patients, as a result of which they often reach some measure of success in treating a number of diseases. Psychological factors that play an important role in the onset of psychosomatic diseases are particularly indicative of advances in cases of these diseases.

Yu. F. Polyakov:

The connection of human health and mental state and the effect of psychological factors on the body, its activity, and its activation in fighting illness have been known and used since time immemorial. The ancient profession of the shaman appeared at the beginning of the human race and continues, incidentally, using the advancements of modern civilization

The history of medicine attests to many centuries of traditions of using psychological factors. Three basic types of treatment are discussed in ancient treatises. They are: the knife, herbs, and the word. Soviet medicine is permeated with ideas about an attentive attitude toward aspects of the spiritual state of the patient for his treatment. G. A. Zakharin, M. Ya. Mudrov, S. P. Botkin, and S. S. Korsakov have discussed this. The observation of the great N. I. Pirogov during the Crimean War suggesting that even the healing of gunshot wounds heal in soldiers is dependent on their emotional state is worth a great deal. He indicated that the wounds healed better and faster in the happy, optimistic soldiers that loved life.

Today, the role of psychological factors is much more difficult. The increase in neuropsychological stresses, emotional stresses, and the difficulties of society have a substantial effect on the change in the structure of disease and the abrupt increase in psychosomatic disorders and borderline conditions. Underestimation of the role of psychological factors, forgetting the chief postulate of medicine to "treat the patient, not the disease", and loss of the principle of appeal to the individual patient are negatively reflected in measures for maintaining health and offering medical care to the public.

V. V. Nikolayeva:

The point is that the patient is not a passive object of manipulations, but acts as a friend or enemy to the doctor in the treatment process. Moreover, he is an active creator of the ailing symptomatology. The matter here is the secondary symptoms of the disease that are psychological in their nature. The foremost of them is the phenomenon of the internal picture of the disease that is an aggregation of the personal assessments, experiences, and thoughts of the person about his illness and its consequences. The nature of the internal picture depends not only on the disease and its severity, but also on the premorbid personality of the patient. Timely psychological assessment of the personality aspects of the patient will provide a reliable prognosis of the success of the treatment and will make it possible to prevent the development of an unfavorable variation of

the internal picture of the disease in him. Take hypochondria for example. The latter, as we know, can become the source of persistent invalidism for man even in conditions of successful treatment of the primary disease.

Consequently, the medical psychologist is a reliable partner with the doctor in organizing an individualized approach to disease diagnosis.

L. I. Vasserman:

Moreover, it should certainly be emphasized that the psychologist's work in the clinic is not only in diagnosis and expertise, no matter what import is ascribed to it. The psychologist, in relying on the research of the personality and social aspects of the functioning of the patients, must directly participate in psychocorrection and sociotherapy work, in the implementation of rehabilitation programs, and in the formation of a "therapeutic" climate in therapeutic and preventive establishments at all levels of public health. Only such an approach, a systemic one, as M. M. Kabanov emphasized, that keeps the person in view, will approach the pathology that goes into and issues forth from it and will make it possible to humanize medicine and make the professional activity of psychologists very effective in a socioeconomic sense.

V. V. Guldán:

Where should medical psychologists work? The need for a high priority orientation is associated with the lack of qualified personnel. In this enormous country only about 1,000 specialists are working in public health fields such as psychiatry, neurology, neurosurgery, defectology [sic], narcology, and somatic medicine. In the USA, for comparison, there are 90,000. Moreover, in the "Monitor" newspaper published by the American Psychology Association, there are dozens of pages devoted to advertising for medical psychologists of various profiles to work in hospitals, specialized centers, and clinics.

In the developed countries of the West, medical psychologists are trained primarily in universities with subsequent advanced training and certification with respect to the various fields of professional activity. In the Soviet Union, psychologists are also trained in universities. However, the numbers are clearly insufficient: 400 persons annually for the entire country. Of them, less than 50 are medical psychologists. With the current situation of affairs for training these specialists, it will take 400 years to satisfy the minimum public health demand for them.

The solution of the personnel problem lies in the establishment of chairs and departments of medical psychology in a number of the nation's leading universities and in expanding the clinical basis for teaching students and using the leading clinics and rehabilitation and restoration centers for these purposes.

The personnel trained in the universities will become the basis in the future for staffing of chairs of medical psychology in the institutes for study and for advanced training.

At the same time, we need to question the training of medical psychology personnel in the Ministry of Health system. One of the possible means there is the establishment of a chair of medical psychology in the medical institutes and institutes for advanced training, establishment of internships and graduate positions, and possibly the re-profiling of a number of faculties and medical higher educational institutes.

Yu. F. Polyakov:

Until recently, the medical psychology service was not represented in the USSR Ministry of Health in any way.

Such a situation of affairs is restraining the organization of a strategy for developing medical psychology and does not make it possible to assess the real demand for the training and distribution of personnel, leaves a number of organizational questions related to work quotas and tariffs unsolved, and retards the solution of problems of advanced training and certification.

I agree that for the development of the medical psychology service in the country we need to first increase the training of the specialist contingent. This is the main problem today. The solution of problems such as equipment supply and circulation of the diagnostic methods do not present any great difficulties. The economic expenses for the organization of a workplace for the clinical psychologist are much lower than expenses for any of the other specialists in the public health field. At the same time, the recoupment of this service, judging by the experience of many countries, is quite great.

L. I. Vasserman:

The professional training of psychologists and doctors as a whole is far from perfect. This problem must be solved in a comprehensive manner by the efforts of various departments, and with consideration of the interests of society as a whole. However, we must not forget about the urgency of a number of measures: the establishment of a psychodiagnostic center, protection of new developments in psychodiagnosis with inventor's rights (the inventor or collective must stand behind the technique), and the development of a position on the work of the psychologist in the field of psychodiagnostics, including a code of ethics, with professional certification of specialists and legislative protection of the rights for this work.

V. V. Guldán:

The list of urgent tasks in medical psychology could be continued. But those things that the USSR Ministry of Health has given most serious attention to for the first time for this problem offer hope. This indicates that the head agency for public health is concerned about the resurrection of a humanitarian, personal approach to the

patient. And I think that soon the doctor will see before him the entire ill person rather than the faceless battalions of ulcers and kidneys.

From the Editor:

We do not doubt the importance of the problems raised by the group of specialists in the field of medical psychology. In reality, the psychological climate in medical

institutions and the relations of the doctor and patient need serious adjustment and improvement. At the same time, there is much that is vague, controversial, and even contradictory in the problems of medical psychology in our country, such as in the relationships between psychology and psychiatry, and other medical specialties.

We hope that the conversation on the newspaper's pages may help in the establishment of a new service.

### Pharmacokinetics of Inhaled Pu-238-Tributyl Phosphate Complex

917C0149A Moscow GIGIYENA I SANITARIYA in Russian No 9, 1990 (manuscript received 9 Jan 89) pp 57-58

[Article by G. A. Demina, G. V. Khalturin, N. I. Andryushkeyeva, O. V. Kuzmenko and L. V. Nikitina, Institute of Biophysics, USSR Ministry of Health, Moscow]

UDC 614.73:615.849.1].07

[Abstract] Female Wistar rats were employed in a study on the comparative pharmacokinetics of Pu-238 (IV) following inhalation of the radionuclide as a nitric acid or tributyl phosphate (TBP) aerosol. In both cases localization of Pu-238 remained predominantly skeletal, with the skeletal load increasing 29-fold over 64 days in the case of Pu-TBP and 4.7-fold in the case of Pu-nitrate. Elimination was largely via the intestinal route: in the case of Pu-TBP, the ratio of the rate of intestinal/urinary excretion increased two-fold during 64 days, whereas in the case of Pu-238-nitrate the ratio fell 11-fold. Blood levels of Pu-238 were always 10- to 70-fold higher with Pu-TBP than with Pu-nitrate. Concomitantly, levels of Pu-238 in the liver, lungs, and the skeleton were 3- to 140-fold greater with Pu-TBP than with Pu-nitrate. Accordingly, the form in which Pu-238 is inhaled has a pronounced effect on its pharmacokinetics and exposure to TBP during nuclear fuel processing cannot be ignored in health risk assessment. Figures 1; tables 2; references 5: 3 Russian, 2 Western.

### Effects of Whole-Body X-Irradiation on Gastrointestinal Uptake of Metals in Relation to Their Valency

917C0149B Moscow GIGIYENA I SANITARIYA in Russian No 9, 1990 (manuscript received 23 May 89) pp 59-61

[Article by M. Ya. Bogomazov, TsOLIUV [expansion unknown], Moscow]

UDC 616.33/.34-008.6-02:615.849.1].07

[Abstract] Gastrointestinal uptake of Cd-109 (II), Cr-51 (III), V-48 (IV) and Nb-95 (IV) in relation to whole-body x-irradiation was assessed in 250-300 g outbred male rats following intragastric (3.7 MBq) or intravenous (37 kBq) administration of the metals. Irradiation of the animals with doses ranging from 0.25 to 20 Gy had both quantitative and qualitative sequelae. In the case of Cd-109 irradiation with a 0.25-14 Gy dose reduced uptake three-fold, while 20 Gy facilitated absorption. The variable effects were attributed to active and passive absorption mechanism differing in susceptibility to x-rays, suggesting the predominant role of active transport over enhanced or exchange diffusion in the case of Cd-109. Cr-51 uptake was increased three-fold by 1 Gy dose and essentially unaffected by smaller or greater dosages, a

result indicative of facilitated diffusion. Uptake of V-48 and Nb-95 was increased 8.2- and 24.2-fold, respectively, by the 8 Gy dose and attributed to exchange diffusion with K<sup>+</sup>. These observations demonstrated that whole-body irradiation may have variable effects on gastrointestinal uptake of heavy metals, depending on the predominant transport mechanism and its susceptibility to radiation. Tables 1; references 10: 9 Russian, 1 Western.

### Effects of Pesticides on Formation of Specific T Suppressors

917C0149C Moscow GIGIYENA I SANITARIYA in Russian No 9, 1990 (manuscript received 26 Jan 89) pp 72-75

[Article by S. D. Zhamsaranova, S. A. Banayeva and T. N. Baglayev, Eastern Siberian Technological Institute, Ulan-Ude]

UDC 615.285.7.015.4:612.124.017.1].076.9

[Abstract] Adoptive transfer studies were carried out on male and female (CBA x C57BL/6)F<sub>1</sub> mice, 20-25 g, subjected to intragastric pesticide administration and intraperitoneal immunization with SRBC to assess the effects of the chemical agents on specific T suppressor cells. The results demonstrated that malathion and 2,4-D in doses ranging from 1/100th to 1/20th LD<sub>50</sub> enhanced formation of specific T suppressors in a dose-dependent manner, with 2,4-D exerting a greater effect on splenic generation of T suppressors than malathion. In view of their environmental impact, it appears that malathion and 2,4-D bear closer scrutiny for possible immunological sequelae in exposed populations. Tables 1; references 23: 11 Russian, 12 Western.

### Sex- and Species-Related Effects of X-Irradiation on Hepatic Cytochrome P-450-Dependent Monooxygenase System

917C0154A Moscow BIOLOGICHESKIYE NAUKI in Russian No 11, Nov 90 (manuscript received 28 Dec 88) pp 47-52

[Article by M. Ya. Akhalaya, L. I. Deyev, A. G. Platonov and A. Khakimov, Cahir of Biophysics, Moscow State University]

UDC 577.391:616-001.26

[Abstract] A comparative assessment of the effects of x-ray irradiation on hepatic mechanisms involved in metabolism of endo- and exobiotics involved determination of aminopyrine-N-demethylase (ADM) activity and cytochrome P-450 (P450) levels in male and female Wistar rats (150-220 g), SHK mice (20-25 g), and guinea pigs (220-280 g). Whole-body x-irradiation with a 4 Gy dose was shown not to affect ADM or P450 in the acute radiation sickness state (seven days for rats and mice, 11 days for guinea pigs). However, irradiation with a 7 Gy

dose reduced the levels of ADM and P450 1.5- to 2.5-fold in the male animals. Changes in the female animals were less pronounced, with reductions limited to 20 - 30 percent. Additional studies with females subjected to a 8.5 Gy dose provided confirmational evidence for the greater radiation tolerance of the microsomal oxidative mechanisms in the female organism in comparison with males. These observations demonstrated that ADM and P450 levels may serve as markers of acute radiation sickness and, furthermore, that the liver microsomes are less susceptible to lipid peroxidation in female animals than in male animals. Figures 1; tables 2; references 14: 4 Russian, 10 Western.

### Radioactive Contamination of Naturally Occurring Waters and Migration of Radionuclides in Water in Southeastern Belorussia

917C0316A Minsk DOKLADY AKADEMII NAUK  
BSSR in Russian Vol 34 No 11, Nov 90 (manuscript  
received 28 May 90) pp 1039-1042

[Article by A. V. Kudelskiy, O. N. Shpakov, V. F. Buzo, and N. L. Budenko (presented by R. G. Garetskiy, academician of the Belorussian Academy of Sciences), Institute of Geochemistry and Geophysics, Belorussian Academy of Sciences]

UDC 551.49:550.4(476)

[Text] As it is known, the cumulative discharge of fission products is estimated at 50.11 MCi, which is about 3.5 percent of the total radionuclides in the reactor at the time of the accident, with consideration of radioactive decay. The spilled radionuclides are similar in composition to the fuel in the damaged reactor, differing in the higher levels of volatile components (iodine, tellurium, cesium, inert gases) in the former. More than two-thirds of the total radioactive fallout was in Belorussia, where the contamination level exceeded 40 Ci/km<sup>2</sup> over an area of 1599 km<sup>2</sup> (0.77 percent of the total area of this republic), constituted 15-40 Ci/km<sup>2</sup> over 4509 km<sup>2</sup> (2.17 percent), 5-15 Ci/km<sup>2</sup> over 9176 km<sup>2</sup> (4.42 percent).

**Snow melt.** Radionuclide ion contamination of melted snow is in the range of 2.1 - 4.3 Bq/l (5.7x10<sup>-11</sup> - 1.2x10<sup>-10</sup> Ci/l). Total beta activity of 30.9 Bq/l (8.4x10<sup>-10</sup> Ci/l) was found in one sample.

Radionuclide contamination of snow water in aerosol form, detected with "blue band" filters is characterized by activity of 2.6 - 20.9 Bq/l (7.0x10<sup>-11</sup> - 5.6x10<sup>-10</sup> Ci/l). In two samples of snow collected in a forest and one from the ice over a lake, total beta activity constituted 51.1, 88.1 and 189.8 Bq/l (1.4x10<sup>-9</sup>, 2.4x10<sup>-9</sup> and 5.1x10<sup>-9</sup> Ci/l), respectively. Gamma spectrometry (Atkam-300) of aerosols characterized by maximum total beta radioactivity revealed presence of different combinations of ruthenium-106, cesium-134 and cesium-137. None of the samples contained cerium-144.

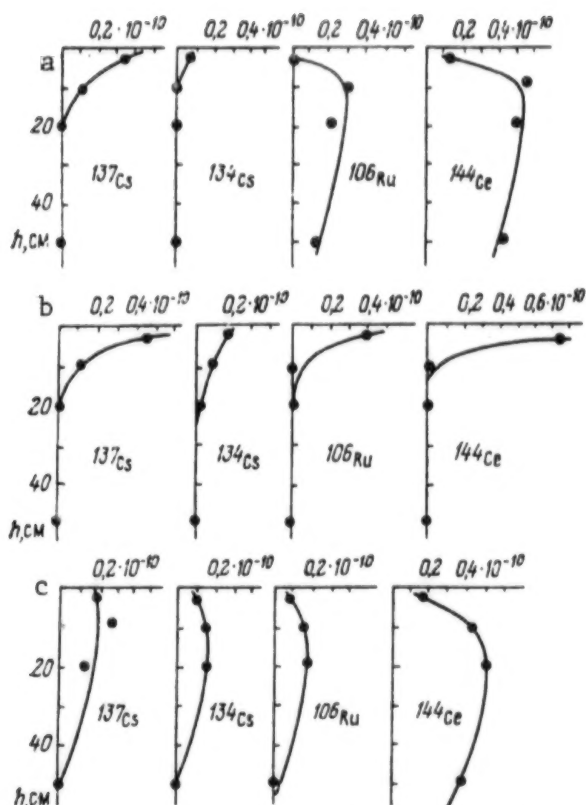
**Surface soil and aeration zone.** Contamination of ground cover exceeds 40 Ci/km<sup>2</sup> within the zone of current isolation, and it is in the range of 1-40 Ci/km<sup>2</sup> in the rest of the territory contaminated with radionuclides. The monitoring of radiation dosage revealed that by 1988 there was some decline due to decay of short-lived radionuclides and deeper subsoil penetration of contamination.

As an example of the variations in concentrations of radionuclides in the soil layer as a function of time we can submit the results of our studies in the region of the village of Zavodok. There, in a drainless depression 5 m away from a body of water, radionuclide concentration in a soil sample taken from a depth of 10 cm as of 24 November 1986 was as follows: 0.161x10<sup>-10</sup> <sup>103,106</sup>Ru, 0.114x10<sup>-9</sup> <sup>134</sup>Cs, and 0.889x10<sup>-9</sup> <sup>137</sup>Cs (overall 0.102x10<sup>-8</sup>). Already on 19 May 1987, at the same depth, the following was found—no <sup>103,106</sup>Ru, 0.221x10<sup>-8</sup>, <sup>134</sup>Cs and 0.522x10<sup>-8</sup>, <sup>137</sup>Cs (overall 0.743x10<sup>-8</sup>). It is remarkable that on 19 May 1987, the top centimeter of soil revealed 0.00645x10<sup>-6</sup>, <sup>103,106</sup>Ru, 0.208x10<sup>-6</sup> <sup>134</sup>Cs and 0.520x10<sup>-6</sup>, <sup>137</sup>Cs (overall 0.725x10<sup>-6</sup>). A comparison of these readings indicates that there was redistribution of radioactive contamination over the section of the aeration zone.

In order to determine the characteristics of vertical migration of radionuclides, a set of field studies was organized in 1987 in the region of the terraces and floodplain of the Sozh and Pripyat rivers using sorbents based on polyphosphate cellulose.

As shown by field studies carried out in May-August 1989 in one of the segments of the Pripyat River terrace in the region of the settlement of Tulgovichi there was a tendency toward stable migration of <sup>106</sup>Ru, <sup>144</sup>Ce and, in part, <sup>137</sup>Cs in water-soluble form. Activity of the soil cover at n10<sup>-6</sup> - n10<sup>-5</sup> Ci/kg, which corresponds to radioactive contamination of 15-40 Ci/km<sup>2</sup>, the depth of <sup>106</sup>Ru penetration reached and exceeded 0.5 m, with maximum accumulation at a depth of 0.1 m. There was an even more significant (Figure a) effect from migration in water of <sup>144</sup>Ce, the depth of which can apparently be rated at 0.75 - 1.0 m. Vertical migration of <sup>137</sup>Cs (to 0.1 m) was much less marked, and there was virtually insignificant vertical migration of <sup>134</sup>Cs in water-soluble forms.

As a result of the field studies of the elevated floodplain of Pripyat River in the Tulgovichi, we found stabilization of radioactive contamination (about the same n10<sup>-6</sup> - n10<sup>-5</sup> Ci/kg) in the soil layer, without visible evidence of vertical migration of radionuclides in water-soluble form (Figure b). There was a different redistribution of radionuclides in the low floodplain of Sozh River near Veprin (Figure c), where there was a distinct tendency toward submersion of <sup>137</sup>Cs, <sup>134</sup>Cs, <sup>106</sup>Ru and <sup>144</sup>Ce isotopes in water-soluble form to a depth of 0.4 m for the first three and 0.5 m or more for <sup>144</sup>Ce.



Accumulation of mobile forms of radionuclides (Ci/g) on polyphosphate cellulose adsorbent over vertical section of aeration zone of terrace (a) and high floodplain (b) of Pripyat River (Tulgovichi), and floodplain (c) of Sozh River (Veprin settlement) in the period of May-August 1989

We must mention the elevation of overall ("flux") beta activity at 2.5 - 19.8 Bq/m<sup>2</sup> at a depth of 10 cm and from 1.0 - 7.0 Bq/m<sup>2</sup> at a depth of 50 cm over the three month period. Accordingly, the rate of build-up of beta activity at depths of 10 and 50 cm fluctuated in the range of 0.8 - 6.6 and 0.3 - 2.3 Bq/m<sup>2</sup> x month. Over the section of peatbogs, overall beta activity ranged from 7.7 - 12.5 Bq/m<sup>2</sup> at a depth of 76 cm.

The presence of a "flux" component in secondary redistribution of radionuclides in the aerated zone is indicative of a distinct tendency toward radionuclide migration from the soil layer (superficial source) in the direction of ground water level. In areas with some flooding and periodic reversal of vertical movement of surface and subterranean water, in zones of so-called "hydrogeological windows", conditions are created for direct "extractional" radionuclide contamination of ground (subterranean) waters.

It was experimentally determined that radionuclides migrate from soil to water extracts (1:5 ratio, one month duration) at the following rates: 0.06 - 0.16 percent <sup>144</sup>Ce, 6.28 - 6.67 <sup>141</sup>Ce, 0.07 - 0.12 <sup>103</sup>Ru, 0.13 - 0.31 <sup>106</sup>Ru, 0.18 - 0.63 <sup>134</sup>Cs, 0.12 - 0.34 <sup>137</sup>Cs, 0.12 - 0.16 <sup>95</sup>Zr, 0.08 - 0.09 <sup>95</sup>Zr together with <sup>95</sup>Nb, 6.68 - 9.28

percent <sup>110m</sup>Ag. Nuclides that change to a dissolved form constitute 0.16 - 0.23 percent of all gamma emitters.

**Surface waters.** In June 1986, radionuclide contamination of the Pripyat River near the accident site was attributable to (in pCi/l): 430+/-110 <sup>131</sup>I, 234+/-50 <sup>134</sup>Cs, 420+/-70 <sup>137</sup>Cs and 240+/-80 <sup>106</sup>Ru. In the Ubert River, the following radioisotopes were found (in nCi/l) immediately after the accident: 21 <sup>144</sup>Ce, 0.98 <sup>141</sup>Ce, 0.23 <sup>103</sup>Ru, 4.8 <sup>106</sup>Ru, 8.6 <sup>134</sup>Cs, 6.1 <sup>137</sup>Cs, 4.0 <sup>95</sup>Zr, 2.8 <sup>95</sup>Zr together with <sup>95</sup>Nb, 3.4 <sup>110m</sup>Ag. But already in May 1987, only cesium-134 (15 pCi/l) and cesium-137 (35 pCi/l) were demonstrable in the Pripyat river water. Before the accident there was an 0.1 ratio of cesium-137 to strontium-90, and after the accident it rose to 6-40.

Thus, flowing bodies of water are characterized by a distinct capacity for self-purification, which is related both to removal of mass beyond the contaminated regions and settling of suspended radioactive particles at the bottom of the rivers.

Testing of lakes, water reservoirs and swamps revealed that their radioactivity was lower by a factor of 10<sup>-3</sup> - 10<sup>-5</sup> than in adjacent territories and bottom silt.

**Subterranean waters.** Superficial radioactive contamination affects the radionuclide composition of subterranean and surface waters. While cesium and strontium activity in subterranean and surface waters constituted thousandths of a Bq/l before the accident, already in 1987, activity of ground water increased in many instances in the currently isolated zone to 0.1 - 0.2 Bq/l (0.3-0.9 pCi/l) for strontium-90 and 5 - 10 Bq/l (150-300 pCi/l) for cesium-137, and in some cases up to 50 - 100 Bq/l (1500-3000 pCi/l).

Before May 1987 no significant rise in overall beta activity of ground water had been noted. But already a year later its total beta activity constituted 0.06 nCi/l (floodplain of Sozh River near Chechersk), 0.08 (floodplain of Berezina River near Svetlogorsk), 0.08 (floodplain of Vedrich River near Rechitsa), 0.1 (floodplain of Braginka River near Bragin) and 0.14 nCi/l (floodplain of Ubert River near the urban settlement Lelchitsa). In August 1988, activity of 0.16 nCi/l (floodplain of Sozh River near Veprin village), 0.07 (near swampy area north of Khoyniki) and 0.09 nCi/l (elevated floodplain of Pripyat River near Tulgovichi village).

In the southern closest zone of radionuclide contamination, it was established that overall beta activity had increased (from 0.13 to 0.17 nCi/l) in potable water of a dairy farm well in the village of Tulgovichi (August 1988 - August 1989). Overall beta activity of water in the service well of the cattle farm in the village of Lomachi constituted 0.13 - 0.16 nCi/l. Cesium-137 (5.1 pCi/l) and strontium-90 (1 pCi/l) were found in the water.

In subterranean potable water of major urban water supply installations, in the period of 1987-1989, there was 6- to 10-fold increase in <sup>90</sup>Sr activity, while <sup>137</sup>Cs activity, which reached a maximum in 1988, then had a

tendency toward decline. A decline in activity of  $^{90}\text{Sr}$  was observed in 1988, but in late 1989 the activity of this nuclide rose to the 1987 level. There was a particularly distinct tendency toward increase in  $^{90}\text{Sr}$  in alluvial and fluvioglacial deposit waters. No significant variations in activity were observed in the water of horizons between moraines.

Thus, this series of field experiments using highly selective synthetic adsorbents based on polyphosphate cellulose demonstrated a decrease in concentration of a superficial (planar) radionuclide source due to removal of water-soluble forms downward through the section of the aeration zone in the direction of the groundwater table. The dynamics and extent of this process require special investigation in order to determine the density of vertical migratory flow of radionuclides as related to the planar source (soil layer) and recipient mass (subterranean water); elements of water balance of radionuclides

in the soil—surface water—bottom sediment—aeration zone—subterranean water system and subterranean drainage, and prognostic models of the future fate of radioactive products of the Chernobyl accident. Radionuclide levels in subterranean waters, including groundwater, as of the middle of 1990 do not exceed permissible levels ( $\text{PL}_b$ ), although in the immediate postaccident period, they were close to the maximum permissible concentration (MPC) in some instances, whereas instances of increased  $^{137}\text{Cs}$  and  $^{90}\text{Sr}$  activity to 550 and 15 Bq/l, respectively, have been recorded in wells and surface waterways.

The demonstrated tendency toward increase in concentrations of strontium-90 in subterranean potable waters merits the close scrutiny of researchers.

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**Utilization of Hemic Iron by *Yersinia pestis* in Human Blood and Blood Sera**

917C0250C Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 14 Jun 89) pp 19-24

[Article by A. N. Kravtsov, V. P. Zyuzina, and V. I. Tynyanova, Rostov-na-Donu Scientific Research Antiplague Institute]

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[Abstract] At 37°C, *Y. pestis* multiplication is observed neither in the blood nor in the blood serum, because entry of iron into the bacterial cell is limited, owing to the fact that, at that temperature, the microbe does not assimilate the iron of glycoprotein transferrin. The researchers assumed that *Y. pestis* cannot use the iron of the transferrin or of haptoglobin and hemopexin, glycoproteins that bind the iron-donors hemoglobin and hemin when erythrocytes are destroyed. In determining whether the reason is either that the microbe cells are incapable of assimilating iron with those complexes or that such a capability is taken away by protein factors, the researchers studied the vaccine strain of *Y. pestis* EV 76. They found that protein components of blood serum do not limit assimilation of hemic iron and that *Y. pestis* did use the iron of free hemoglobin. Free hemin was found to not only prevent the growth of *Y. pestis* in serum, but also to destroy it. Figures 4; references 9: 5 Russian, 4 Western.

**Study of the Biological Properties of Production Strain 205 of Tick-Borne Encephalitis Virus. Virulence, Thermal Stability, and Resistance to the Action of Urea**

917C0250E Moscow ZHURNAL MIKROBIOLOGII, EPIDEMIOLOGII I IMMUNOBIOLOGII in Russian No 10, Oct 90 (manuscript received 10 Nov 89) pp 38-41

[Article by I. V. Kotykhov, N. N. Kiseleva, Yu. V. Fedorov, Tomsk Medical Institute, Tomskiy Scientific Research Institute of Vaccines and Sera of Virion Scientific Production Association]

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[Abstract] The virulence, sensitivity, and response to elevated temperature and urea of production strain 205 of TBE were studied, as were the components of its population. Outbred white mice (7-8 g) highly susceptible to TBE virus served as the model for investigation of virulence. Strain 205 was found to be highly virulent both in i.c. (mNic+) and s.c. (mNsc+) administration of a 10-fold dilution. The clinical picture was typical for TBE. Thermal stability was determined by heating a mixture of 10 percent cerebral suspension of the virus and a phosphate buffer solution, pH 7.4, in a 1:5 (V/V) ratio. Identification of the T<sub>50</sub> marker indicated that the strain's protein shell is resistant to the effects of temperature. In a study of the sensitivity to the denaturing action of urea at 35°C for 30 minutes, the strain and most of its clones were judged resistant (U<sup>r</sup>). Intraperitoneal immunization of guinea pigs (350-400 g) with a 10 percent cerebral viral suspension purified beforehand on the centrifuge demonstrated that the strain and its clones have marked antigenic properties in vivo. Figures 1; references 11: 10 Russian, 1 Western.

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